

*Pogonotriccus ophthalmicus*, *Zimmerius chrysops*, *Mecocerculus poecilocercus*, *Serpophaga cinerea*\*, *Mionectes striaticollis*, *Mionectes olivaceus*<sup>1</sup>, *Pseudotriccus pelzelni*, *Pseudotriccus ruficeps*, *Poecilotriccus ruficeps*, *Myiotriccus ornatus*, *Myiophobus flavicans*, *Pyrrhomyias cinnamomea*, *Contopus fumigatus*, *Sayornis nigricans*, *Ochthoeca diadema*, *Ochthoeca cinnamomeiventris*<sup>1</sup>, *Myiarchus tuberculifer*\*, *Myiozetetes similis*\*, *Myiodynastes chrysocephalus*, *Tyrannus melancholicus*, *Pachyrhamphus versicolor*<sup>1</sup>, *Pipreola riefferii*, *Lathria cryptolophus*<sup>2</sup>, *Rupicola peruviana*, *Masius chrysopterus*, *Cyanolyca turcosa*, *Vireo leucophrys*, *Myadestes ralloides*, *Catharus fuscater*, *Turdus fuscater*, *Turdus serranus*, *Cinclus leucocephalus*, *Progne chalybea*\*, *Notiochelidon cyanoleuca*, *Stelgidopteryx ruficollis*\*, *Cinnycerthia olivascens*, *Troglodytes aedon*\*, *Troglodytes solstitialis*, *Henicorhina leucophrys*, *Parula pitiayumi*\*, *Dendroica fusca*, *Geothlypis semiflava*\*, *Myioborus miniatus*, *Basileuterus tristriatus*, *Basileuterus coronatus*, *Conirostrum albifrons*, *Diglossopsis cyanea*, *Diglossa albilatera*, *Pipraeidea melanonota*, *Euphonia xanthogaster*, *Tangara arthus*, *Tangara parzudakii*, *Tangara ruficervix*, *Tangara nigroviridis*, *Tangara cyanicollis*\*, *Anisognathus somptuosus*, *Anisognathus notabilis*, *Thraupis episcopus*\*, *Thraupis palmarum*, *Thraupis cyanocephala*, *Ramphocelus icteronotus*\*, *Piranga leucoptera*\*, *Chlorospingus canigularis*<sup>2</sup>\*, *Chlorospingus semifuscus*, *Hemispingus melanotis*<sup>2</sup>, *Catamblyrhynchus diadema*, *Pheucticus chrysogaster*, *Volatinia jacarina*<sup>2</sup>, *Sporophila nigricollis*, *Atlapetes tricolor*, *Atlapetes leucopterus*, *Buarremon brunneinucha*, *Zonotrichia capensis*, *Carduelis xanthogastra*\*. Total= 155.

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## A new subspecies of Slater's Monal *Lophophorus sclateri* from western Arunachal Pradesh, India

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Slater's Monal *Lophophorus sclateri* T. C. Jerdon, 1870, is one of three species of monal (Phasianidae). It is a restricted-range species occurring within the Eastern Himalayas Endemic Bird Area D08 (ICBP 1992), where it is found in the remote high mountains of Arunachal Pradesh in India, south-east Tibet, northern Myanmar and western Yunnan in China (Ali & Ripley 1983, Smythies 1986, Johnsgard 1986, McGowan & Garson 1995). Slater's Monal has remained poorly known and is currently considered Vulnerable (Collar *et al.* 2001; also Fuller & Garson 2000). Most published information on this species is more than 50 years old and is largely based on natural history notes from Bailey (1916), Beebe (1918–1922), Baker (1919), Kinnear (1934), Ludlow & Kinnear (1937, 1944), Ali & Ripley (1948) and Ludlow (1951). A few recent surveys and studies have produced some information on this species (Kaul & Ahmed 1992, 1993, Kaul *et al.* 1995, Singh 1994, 1999, Han 2001, Rimlinger *et al.* 2001).

Within Arunachal Pradesh, *L. sclateri* was thought to occur from 92°–93°E eastwards through the Kameng, Subansiri, Siang and Lohit Districts (Ali & Ripley 1983). However, the confirmed westernmost record for this species is from Mechuka locality in West Siang District, central Arunachal Pradesh (Kaul *et al.* 1995), east of

94°E. How far the species extended west and its exact western limit was not known. In the hope of collecting new locality records of this species, and also information on other Galliformes, a survey was conducted in early 1998 in western Arunachal Pradesh. The areas visited were along the Great Himalayan Range and especially in the East Kameng and Lower Subansiri Districts (Fig. 1), which had not been visited previously by biologists. During this survey evidence was obtained of a Sclater's Monal that differed morphologically from the published descriptions.

### Discovery of the subspecies

In April 1998, while we were surveying the interior parts of Lower Subansiri, a few local tribesmen readily recognized *L. sclateri* (known locally as *thade*) from the pictures shown to them. They did, however, insist that the tail of the males was not coloured as in the picture (chestnut with a white subterminal band) but was completely white. Subsequently, SKR came across four completely white retrices in the

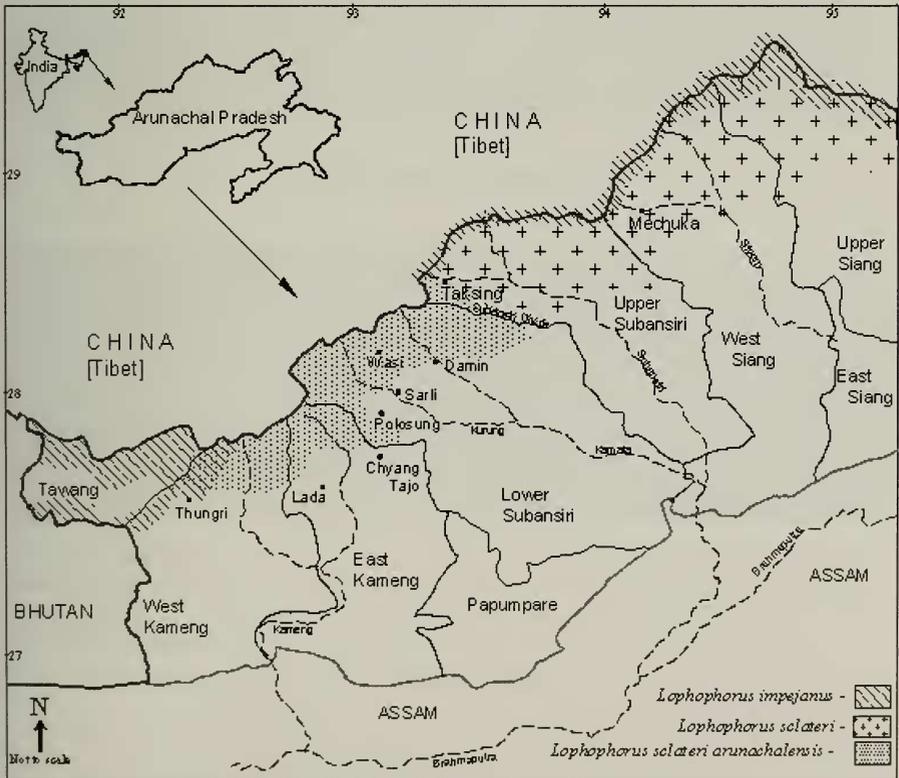


Figure 1. Map of Arunachal Pradesh showing the distribution of *L. s. arunachalensis* subsp. nov., along with that of the nominate form and Himalayan Monal.

possession of local people in Damin and Sarli localities in the district. Attached to the rectrices were a few iridescent bluish-green body feathers that were undoubtedly of a monal. The flat, almost square rectrices completely lacked the chestnut coloration of *L. sclateri* and resembled neither the Himalayan Monal *L. impejanus* nor the Chinese Monal *L. lhyusii*, in which the rectrices are cinnamon and iridescent bluish-green respectively. Local people hunt the monal for food and use the tail feathers as a status symbol, and bind the feathers of a complete tail together as a fan. Initially, we thought that the white rectrices might belong to subadults or a morph of *L. sclateri*, but no 'normal' *L. sclateri* tail feathers were found, and it was considered unlikely that the local people only hunted the monals with white tails. Furthermore, there was no mention of this species having any white tail feathers in the literature.

Davison (1974, 1978) proposed an eastern subspecies of Sclater's Monal *L. s. orientalis* based on differences in the width of the white subterminal band along the east-west axis of its range. He proposed that in the areas where *L. sclateri* overlaps with *L. impejanus*, the former has more white in the tail through character displacement. The white rectrices we collected were from an area where the above two species were thought to meet, but local people there did not recognize *L. impejanus* and believed that it did not occur in their area. No tail feathers of this species were seen, thereby rendering a character displacement explanation of our white-tailed birds somewhat doubtful.

### Subsequent observations

*10 May 1998.* High mountain pass between Sarli and Chayang Tajo, East Kameng District. Tracks and feeding signs, claimed to be of monals by local people, found at 3,400 m but no birds seen.

*17 October 1998.* Pakdhung camp in the mountains north of Sarli. At 0545 h a male monal seen calling from above the camp in the alpine meadow zone at 4,200 m, with others heard nearby. Between 0600 h and 0930 h, four males and nine females seen and a pair photographed. In the following two days another five females were seen. Back in Sarli a badly damaged and maggot-infested skin of a male and female of the monal were seen with a hunter.

*25 October 1999.* Wasi camp close to Pakdhung at 3,800 m in the alpine scrub zone. A single male sighted by local assistants and in the following two days a male, female and two subadults were seen between 3,700 m and 3,900 m. At Sarli itself, SKR obtained three skins of the monal (a male, female and immature male) that were in the possession of local people. Another monal skin that appeared to be an immature was also observed with a hunter but could not be obtained.

*8 November 1999.* In the mountains higher up from Polosung village west of Sarli. One male monal sighted by local assistants at 3,700 m, and the following day a male



Figure 2.a. The new Sclater's Monal subspecies *Lophophorus sclateri arunachalensis* (right) compared with nominate Sclater's Monal (*L. s. sclateri*). Oil painting by Debasis Kabasi and R. Suresh Kumar.



b. Rectrices of male monals showing indications of possible intergradation with *Lophophorus sclateri*. Shown on left is the Taksing form, centre *L. s. arunachalensis* subsp. nov. and right Polosung form.

c. The alpine meadow habitat where the new subspecies was found (c.4,100 m).

and female monal were spotted by them at 3,800 m. Interestingly, complete rectrices of a male monal from Polosung had a slight chestnut splash along the outer margins of the two outermost feathers, which initially was mistaken for blood stains (Fig.2b).

12 January 2000. Redding village close to Taksing border post, Upper Subansiri District. A set of rectrices of a male monal was obtained from a hunter that appeared to be a possible intergrade between the white-tailed bird and Sclater's Monal: 11 of the 16 feathers had small chestnut spots at the centre of each vane close to the terminal end (Fig.2b). It is not known whether or not these rectrices belong to an immature male of *L. s. sclateri*. No other rectrices were found showing indications of intergradations or consistent variation according to geographical position.

### Determination of the subspecies

In 2001, SKR examined 38 skins of *L. sclateri* (Appendix) along with other monal skins in several museums (see Acknowledgements). Only at the Bombay Natural History Society (BNHS) was it possible to compare directly the material collected from white-tailed monals with specimens of *L. sclateri*. In all other museums a series of photographs was compared with Sclater's specimens (including the holotype at BMNH). On examination, the white-tailed form was found to resemble *L. sclateri* in morphology and overall plumage coloration, except for the white tail in the male and the overall darker plumage in the female. Furthermore, plotting the known ranges of the two forms (Fig. 1) revealed that white-tailed birds do not appear to be completely geographically isolated from *L. sclateri*, as no significant geographical barriers were found. Given the lack of essential evidence on reproductive isolation, in the form of information on vocalizations, behaviour and genetic make-up, we propose the recognition of the white-tailed form as a subspecies of *L. sclateri* under the Biological Species Concept.

### *Lophophorus sclateri arunachalensis*, subsp. nov.

**Holotype** Bombay Natural History Society (BNHS) No. 28946, adult male from Wasi camp close to Pakdhung, Sarli, Lower Subansiri District, Arunachal Pradesh, approx. 28°05'N 93°07'E, India; collected by Suresh Kumar R. from local people who killed the bird for food on 8 November 1999 at 3,800 m in the alpine scrub zone.

**Paratypes** BNHS No. 28948, adult female and BNHS No. 28947, immature male from Wasi camp, Sarli, Lower Subansiri District, Arunachal Pradesh, approx. 28°05'N 93°07'E, India; collected by Suresh Kumar R. from local people who killed the birds for food on 26 October 1999 at 3,750 m in the alpine scrub zone.

**Diagnosis** A large, sexually dichromatic typical monal (*Lophophorus*) resembling *Lophophorus sclateri* (Fig. 2a). The presence of curly crown feathers in the male, which is a feature distinctive of *L. sclateri*, is a clear indication of the relatedness of these two forms. The two other species, *L. impejanus* and *L. lhyusii*, differ in size and have a crest of spatulated and elongated feathers respectively, as well as other differences. Both sexes of *L. s. arunachalensis* are very similar to nominate *sclateri*

in size (Table 1), bare-part coloration, and plumage pattern and coloration. However, the male differs in having a completely white tail, unlike the chestnut tail with a white subterminal band in nominate *sclateri*. The female differs from nominate *sclateri* largely in having darker overall plumage with other minor differences. Only one female Sclater's Monal skin (BMNH: 1938.12.13.454) closely resembles the subspecies in overall coloration, although with minor differences in the tail colour pattern.

**Description** Plumage colour matching was made using Smithe (1975) under natural light. Both the male and female of the subspecies *arunachalensis* were considered adults based on their plumage and bright coloration of the bare parts.

**Adult male (holotype).** The highly iridescent plumage coloration of the head, neck, back, scapulars and wings, and the velvety black ventral coloration resemble that of nominate *sclateri*. The only feature that distinguishes the two is the white tail

TABLE 1

Comparison of morphometrics [mean  $\pm$  s.d., n (range)] for measurements (mm) of both sexes of *Lophophorus sclateri arunachalensis* subsp. nov., *L. s. sclateri* (specimens listed in Appendix), *L. lhuyssii* and *L. impejanus*. The mensural data could not be statistically tested due to insufficient sample size (for male and female *arunachalensis* is n=1), but measurements of *L. s. arunachalensis* fall within the range of the nominate form. All measurements except the wing and tail were taken using a vernier calliper.

Variable	Male				Female			
	<i>sclateri arunachalensis</i>	<i>sclateri sclateri</i>	<i>lhuyssii</i>	<i>impejanus</i>	<i>sclateri arunachalensis</i>	<i>sclateri sclateri</i>	<i>lhuyssii</i>	<i>impejanus</i>
Beak length from skull	-	-	-	-	52.8	48.8 $\pm$ 4.0, 7 (43.3-53.9)	56.2 $\pm$ 0.0, 2	49.5 $\pm$ 3.4, 13 (44.1-55.4)
Beak length from skin	33.1	34.2 $\pm$ 1.1, 12 (32-36.7)	48.5 $\pm$ 4.1, 10 (44.0-56.3)	37.0 $\pm$ 2.5, 16 (31.4-40.9)	32.9	31.8 $\pm$ 2.2, 8 (27.5-34.8)	43.6 $\pm$ 4.2, 3 (39.3-47.7)	34.6 $\pm$ 1.3, 14 (31.9-36.4)
Beak length from nares	29.8	31.2 $\pm$ 1.0, 12 (29.4-32.1)	38.6 $\pm$ 3.7, 10 (29.3-41.4)	32.0 $\pm$ 1.6, 16 (29.6-34.5)	30.7	28.7 $\pm$ 2.0, 8 (25.8-32.0)	35.8 $\pm$ 2.3, 3 (34.3-38.4)	29.5 $\pm$ 1.0, 14 (27.6-31.1)
Wing length (flattened chord)	308	308.5 $\pm$ 9.9, 13 (297-327)	332.9 $\pm$ 7.5, 13 (319-342)	293.2 $\pm$ 6.9, 16 (284-310)	281	283.1 $\pm$ 9.6, 9 (269-298)	315.0 $\pm$ 6.1, 3 (311-322)	268.3 $\pm$ 8.2, 15 (257-284)
Tarsus length	76.6	77.1 $\pm$ 1.7, 12 (74.3-80.4)	80.0 $\pm$ 2.8, 12 (76.7-85.8)	71.4 $\pm$ 2.6, 17 (66.9-77.2)	64.1	67.7 $\pm$ 2.4, 9 (64.2-71.9)	76.6 $\pm$ 3.4, 3 (74.6-80.6)	65.6 $\pm$ 1.6, 15 (63.1-68.6)
Tail length	192	198.3 $\pm$ 10.1, 12 (181-211)	271.4 $\pm$ 14.8, 13 (250-295)	214.3 $\pm$ 21.6, 16 (154-243)	184	168.1 $\pm$ 11.3, 9 (149-185)	234.3 $\pm$ 13.3, 3 (219-243)	183.1 $\pm$ 10.1, 15 (167-203)

Beak length from skull—measured from the depression in the forehead (beak and head joint) to tip of the beak. Beak length from nares—measured from the anterior end of the nostril to the tip of the beak. Wing length—measured using a metal scale from the bend at the wrist region to the tip of the longest primary with wing pressed firmly. Tarsus length—measured from the depression in the tarso-metatarsial joint to the end of the tarsus.

coloration in *arunachalensis*, which is Chestnut (32) with a narrow subterminal white tail-band in the nominate *sclateri*. In *arunachalensis* a few feathers in the rump show faint brown central streaks whilst in nominate *sclateri* the central streaks are faint or dark closest to Dark Grayish Brown (20), in different individuals and in a few birds faint iridescent coloration on the streak is present. In the adult male the orbital skin coloration, when fresh, is bright blue, closest to Spectrum Blue (69); the legs are greenish-yellow; the beak is pale yellow; the iris coloration is not known; and the claws are dusky brown.

*Adult female (paratype)*. Overall plumage coloration similar to nominate *sclateri* except that it is darker. Also differs in the lower back, rump and tail colour pattern. Lower back and rump coloration in *arunachalensis* is close to Olive Gray (42) but duller, with brown striations closest to Blackish Neutral Gray (82), whilst in nominate *sclateri* the coloration is dirty greyish-white, close to Smoke Gray (45), with thin wavy brown stripes closest to Olive Brown (28) and with faint cinnamon in a few places. Also the white streaks along the midrib in the rump feathers of *arunachalensis* is prominent compared to that of nominate *sclateri*. Tail coloration in the subspecies is closest to Blackish Neutral Gray (82) but darker, with thin irregular white wavy stripes and with very little lateral mottling compared to nominate *sclateri*, where the tail coloration is closest to Fuscous (21) but darker with very pale Cinnamon (39) wavy irregular stripes and with lateral mottling of Cinnamon (39) that appears to occur in distinct bands. The terminal end of the tail in *arunachalensis* is more broadly tipped with white than in nominate *sclateri*. In the adult female the orbital skin, when fresh, is bright blue closest to Spectrum Blue (69); the legs are pale greenish-yellow; the beak is pale yellow; the iris brown; and the claws dusky brown.

*Immature male (paratype)*. Judged in its first-year (immature) plumage, and although not surgically sexed it was considered a male because a few iridescent bluish-green feathers were observed on the sides of the neck behind the ear-coverts. Overall appearance as in the female, although the brownish-black, closest to Blackish Neutral Grey (82), plumage coloration of the lower throat, breast and some parts of the belly distinguishes it. Also, unlike in the female, the lower back and rump plumage has a white background with prominent wavy terminal barring of dark brown closest to Blackish Neutral Grey (82), followed by finer wavy or mottled markings of the same. The tail is more broadly tipped with white than in the female. The orbital skin is much more extensive than in the female and is dotted with tiny black feathers; part of the forehead is featherless or with tiny black feathers as in the male; the lores have a sparse covering of tiny black feathers and small white feathers. In the immature male the orbital skin, when fresh, is bright blue closest to Spectrum Blue (69); the legs are pale greenish-yellow; the bill is pale yellow; the iris is brown; and the claws are dusky brown.

### Ecology and behaviour

**Distribution** *L. s. arunachalensis* has been seen by SKR only at the type locality in Lower Subansiri, Arunachal Pradesh. However, indirect evidence, in the form of

tail feathers and interviews with local people, indicates that this subspecies occurs elsewhere in Lower Subansiri and in East and West Kameng Districts in the west of the state (Fig. 1), where previously nominate *sclateri* was assumed to occur. The subspecies *arunachalensis* there is restricted mainly to the high mountains of the main Himalayan Range along the India–China border. Local hunters reported not having seen this monal on the north side of the main range, which is largely dry and unlike the wet forested area in the south. Three major rivers, Kameng, Kurung and Kamala, originate here; the last two are tributaries of the Subansiri.

The precise eastern and western distribution limits of *arunachalensis* are not known. At the eastern end of its range there is a mountain range we call the 'Subansiri Divide'. This lies close to the Subansiri River that constitutes the district boundary between the Upper and Lower Subansiri Districts and probably acts as a barrier to some extent. The Divide may not, however, be an effective barrier because there are few high ridges. Nonetheless, nominate *L. sclateri* was found to occur only east of this Divide and the new subspecies only to the west, with the possible exception being around the Taksing area close to the Divide where the two may overlap. The western limit of the new subspecies's range appears to be along the Sela Range, which forms the district boundary between Tawang and West Kameng Districts. The subspecies may overlap here with *L. impejanus*. Towards the western end, the subspecies is probably rare, as few local people recognised it and those that did reported seeing it only occasionally. In parts of East Kameng and Lower Subansiri Districts, which are the stronghold of the new subspecies, *L. impejanus* appears to be absent.

**Habitat** At the type locality SKR observed *L. s. arunachalensis* in the alpine scrub and alpine meadows between 3,800 m and 4,200 m, whilst local assistants reported seeing the monal at 3,700 m in the temperate forests at the edge of the scrub zone. The alpine scrub is characterised by a few species of dwarf rhododendron *Rhododendron ciliatum*, *R. thomsonii*, *R. kaycei* and other unidentified *Rhododendron* spp., along with fir *Abies densa*, the last being the dominant tree species here, occurring up to 3,900 m. Also *Cassiope fastigiata*, and species of *Rubus*, *Berberis* and *Cotoneaster* are present along the treeline and alpine scrub. The ground cover is largely comprised of grass (*Agrostis* sp.); herbs and low shrubs were in the senescent stage during the survey. Most sightings of the monal in October 1998 were made in these high alpine areas (Fig. 2c). Oak *Quercus* sp., *Rhododendron* spp. and maple *Acer caudatum* dominate the temperate forest and are highly impenetrable because of a dense understorey of hill bamboo *Thamnocalamus spathiflorus* var. According to local hunters the monals descend from the alpine meadows to the temperate forests, down as far as 3,000 m during the winter. The mountain slopes on the whole are rugged and steep, with sheer drops straight down to the river in some places.

**Vocalizations** The earliest calling male was first heard at 0545 h when it was still twilight. The call was a series of double-noted, moderate- to high-pitched *koo(n)iak*,

*koou(n)iak*, *koouou(n)iak*. The first note of the call is more of a whistle, wavering occasionally and ending in a cluck-like note. When flushed, three females and a male made a rapid *ki-ki-ki...kiyak, kiyak, kiyuk kvuk kvuk* in flight and, after alighting on a rock outcrop the male made the double-noted *koo(n)iak, koou(n)iak, koouou(n)iak* call for a while. Differences in vocalizations from nominate *sclateri* are not known because recordings of the latter were not available for direct comparison. Furthermore, the information available in the literature on the vocalization of *Sclater's Monal* is very sketchy.

**Food** The gizzard contents of three female, one immature male and one male *arunachalensis* collected from a hunter in Sarli, Lower Subansiri District, contained large number of small pebbles, roots, tubers, seeds and bark or leaf parts. The crop contents of a female contained leaves of *Potentilla* sp., *Cardamine* sp. and *Gaultheria* sp. On four occasions the birds were observed digging the ground. We searched for digging or scrape signs from where the birds were flushed. In a few of the dug-over areas there were remains of the underground bulb of the Cobra Lily *Arisaema* sp. It appeared that the birds fed on the inner fleshy part of the bulb. Local hunters reported using the bulb of *Arisaema* as bait in snares to trap the monal. Similar dug-over areas and scrape signs were observed at the type locality and at a few other sites.

**Movements and behaviour** At the type locality *arunachalensis* was found to be extremely shy; the birds flushed at the earliest notice and this was believed to be due to the high level of hunting in the area. However, on one occasion a male was observed calling from a ridgetop whilst three females and a male were feeding quietly further down the slope. On seeing us approach the feeding birds, the male started calling continuously instead of flushing and it only flushed after the birds below left the area.

Most females were in flocks of two or three, or with a single male. The female flocks however may have also consisted of subadults, which appear similar to adult females. Males were typically observed singly. A male appeared in the same area from where it had flushed either later in the day or on the next day, and if this was the same individual this may indicate some site-fidelity. Local hunters reported taking advantage of such predictable movements to place snares or set camps from which they could shoot birds. When flushed, the monals glided across or down the slope at great speeds and often to great distances, and on a number of occasions they flew down into the *Abies* forest in the alpine scrub area. According to local hunters, the monals leave the summer habitat of the alpine meadows and scrub by early October, when they move down to the alpine scrub that lies next to the temperate forest. They may descend even further.

**Etymology** This subspecies is named after the Indian state of Arunachal Pradesh, to which it is probably endemic. Emphasizing the name will further highlight the biological richness of the state, as well as drawing attention to the subspecies's restricted distribution. Arunachal Pradesh is renowned for its biodiversity and is

listed among the 18 biodiversity hotspots of the world (Myers 1988, 1990). Ten of India's 17 species of pheasants are found in the state, more than any other.

**Geographic differentiation** As there is no marked difference in morphology and little deviation in plumage coloration from nominate *sclateri*, except for the all-white tail in the male, *arunachalensis* may not have been isolated long from the nominate form. Furthermore, information presented here on the distribution of the subspecies suggests that it is probably incompletely geographically isolated. Nevertheless, we believe that the Subansiri River, which flows close to the contact zone of the two or the adjacent mountain ridge that forms the district boundary between the Lower and Upper Subansiri districts, may have acted as a partial barrier.

It may be relevant that areas along the Himalaya that lie west of 93°E receive more rainfall than areas to the east (Ludlow & Kinnear 1944), and this coincides with the nominate subspecies's distributional limits, with the new subspecies to the west. Consequently, the difference in rainfall may have had an impact on habitat, and this in turn may have influenced geographic differentiation of the plumage coloration in the subspecies. In the genus *Lophophorus*, tail feathers play a major role during courtship display, where the tail feathers are held high and fanned out, and slowly flicked up and down (Gaston *et al.* 1982, Johnsgard 1986). Selection for conspicuousness of these feathers might have occurred in wetter, lusher vegetation.

**Conservation** *L. s. arunachalensis* is not currently threatened, because in most parts of its narrow range, especially in the interior, a large proportion of its habitat is so remote as to be intact. The habitat is affected very little by shifting cultivation or slash-and-burn agriculture, as this practice is confined to areas below 2,000 m, far below the subspecies's altitude range. Although the small geographic extent of the subspecies's range is of concern, the only current threat is hunting by local people. Even this may be marginal, because larger species such as Takin *Budorcas taxicolor* and Serow *Nemorhaedus sumatraensis* are preferred by hunters. The Nishi tribes, living in the East Kameng and Lower Subansiri Districts, consider the monal sacred and have certain taboos against hunting it. In a few areas, however, hunting is extensive and more and more people are using guns, which could possibly lead to local extinctions of the new subspecies.

The new subspecies may face some degree of risk as no part of its small range falls under any protected area designation. Moreover, hunting is difficult to curb, as it is a part of the culture of the tribes with which this taxon co-exists. Declaring a large protected area extending from Tawang to Lower Subansiri District, and ensuring that it is effective, is one way of improving the survival prospects of the subspecies, along with other threatened species such as Takin, Musk Deer *Moschus chrysogaster* and Red Panda *Ailurus fulgens*. More surveys to collect information on the exact distribution of the subspecies, and studies especially in the region of contact or overlap with both *L. s. sclateri* and *L. impejanus*, should be initiated to clarify the conservation status of the species.

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### References:

- Ali, S. & Ripley, S. D. 1948. The birds of the Mishmi Hills. *J. Bombay Nat. Hist. Soc.* 48: 1–37.
- Ali, S. & Ripley, S. D. 1983. *Handbook of the birds of India and Pakistan*. Oxford Univ. Press, New Delhi.
- Bailey, F. M. 1916. Notes from southern Tibet. *J. Bombay Nat. Hist. Soc.* 24: 72–78.
- Baker, E. C. S. 1919. The game birds of India, Burma and Ceylon. *J. Bombay Nat. Hist. Soc.* 26: 319–337.
- Beebe, W. 1918–1922. *A monograph of the pheasants*. Reprinted in 1990 by Dover Publications, Inc. New York.
- Davison, G. W. H. 1974. Geographic variation in *Lophophorus sclateri*. *Bull. Brit. Orn. Cl.* 96: 163–164.
- Davison, G. W. H. 1978. Further notes on *Lophophorus sclateri*. *Bull. Brit. Orn. Cl.* 98: 116–118.
- Fuller, R. A. & Garson, P. J. 2000. *Pheasants: status survey and conservation action plan 2000–2004*. IUCN, Gland, Switzerland & Cambridge, UK and World Pheasant Association, Reading, UK.
- Gaston, A. J., Lelliot, A. D. & Ridley, M. W. 1982. Display flights of the male Monal pheasant, *Lophophorus impejanus*. *World Pheasant Assoc. J.* 7: 90–91
- Han Lianxian, 2001. Research on Sclater's Monal in west Yunnan, China—WPA Progress Report June 1999 to June 2000. *Tragopan* 13/14: 15–17.
- ICBP. 1992. *Putting biodiversity on the map: priority areas for global conservation*. International Council for Bird Preservation, Cambridge, UK.
- Jerdon, T. C. 1870a. Letter on some new species of birds from the north-east frontier. *Ibis* (2) 6: 147–148.
- Jerdon, T. C. 1870b. Notes on some new species of birds from the north-eastern frontier of India. *Proc. Asiatic Soc. Bengal* 1870: 59–61.
- Johnsgard, P. A. 1986. *The pheasants of the world*. Oxford Univ. Press.
- Kaul, R. & Ahmed, A. 1992. Pheasant studies in north-east India, Arunachal Pradesh. Unpublished Report. Prepared for the Peter Scott Trust, Jamnagar, India.
- Kaul, R. & Ahmed, A. 1993. Pheasant surveys in Arunachal Pradesh, India, in February–March 1991. Pp. 50–54 in Jenkins, D. (Ed.). *Pheasants in Asia 1992*. World Pheasant Association, Reading, UK.

- Kaul, R., Raza, R. & Kalsi, R. 1995. Pheasant surveys in Arunachal Pradesh, India. Pp. 28–34 in Jenkins, D. (Ed.). *Ann. Rev. World Pheasant Assoc.* 1993/94. World Pheasant Association, Reading, UK.
- Kinnear, N. B. 1934. On the birds of the Adung Valley, north-east Burma. *J. Bombay Nat. Hist. Soc.* 37: 347–368.
- Ludlow, F. & Kinnear, N. B. 1937. The birds of Bhutan and adjacent territories of Sikkim and Tibet. *Ibis* (14) 1: 1–46, 249–293, 467–504.
- Ludlow, F. & Kinnear, N. B. 1944. The birds of south-eastern Tibet. *Ibis* 86: 43–86, 176–208, 348–389.
- Ludlow, F. 1951. The birds of Kongbo and Pome, south-east Tibet. *Ibis* 93: 547–578.
- McGowan, P. J. K. & Garson, P. J. 1995 *Pheasants: status survey and conservation action plan 1995–1999*. IUCN, Gland, Switzerland & Cambridge, UK.
- Myers, N. 1988. Threatened biotas: “hotspots” in tropical forests. *Environmentalist* 8: 187–208.
- Myers, N. 1990. The biodiversity challenge: expanded hot-spots analysis. *Environmentalist* 10: 243–256.
- Rimlinger, D., Bland, J., Xianji, W. & Xiaojun, Y. 2001. Survey for Sclater’s Monal in northwestern Yunnan. *Tragopan* 13/14: 17–19.
- Singh, P. 1994. Recent bird records from Arunachal Pradesh, India. *Forktail* 10: 65–104.
- Singh, P. 1999. Bird survey in selected localities of Arunachal Pradesh, India—March 1997 to July 1998. Unpublished report. Wildlife Institute of India, DehraDun.
- Smith, F. B. 1975. *Naturalist’s color guide*. American Museum of Natural History, New York.

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### Appendix 1

List of *Lophophorus sclateri* specimens examined:

BNHS 13354: m; collected 1913; Hpinaw, between Kachin Hills & China; F. C. Louis. BNHS 13355: f; collected 1913; Hpinaw, between Kachin Hills & China; F. C. Louis. BNHS 13356: f; collected 1914; Htawgaw, between Kachin Hills & China; F. C. Louis. BNHS 13357: m; collected 9.3.1913; Tsu River, Mishmi Hills, Assam (c.2,120 m); Capt. F.M. Bailey. BNHS 13358: m; collected 1913; Tsu River, Mishmi Hills, Assam (c.2,120 m); Capt. F.M. Bailey. NMNH 328067: m; Delei Valley, Mishmi Hills (c.2,425 m), Upper Burma; brought by Mishmis. NMNH 328068: m; collected 4.4.1927; Delei Valley, Mishmi Hills; T.P.M. O’Callaghan. NMNH 608867: m; collected January 1, 1947; Mishmi Hills, N.E. Assam; S.D. Ripley. YPM 42186: f; collected 4.2.1927; Furzz, Delei Valley, Mishmi Hills; brought by Digaru Mishmis. YPM 42187: m; Upper reaches of the Don river, East of Sadiya, Assam, India (c.2,120 m); T.P.M. O’Callaghan. AMNH 543101: m; collected August 1925; Shweli-Salween Divide, N.W. Yunnan (c.3,330 m, rocky and ravine slopes); G. Forrest. AMNH 543102: Juvenile m; collected September 1925; Shweli-Salween Divide, N.W. Yunnan (c.3,640 m, rocky and ravine slopes); G. Forrest. AMNH 543103: m; collected August 1925; Shweli-Salween Divide, N.W. Yunnan (c.3,330 m, rocky and ravine slopes); G. Forrest. AMNH 543104: m; collected August 1925; Shweli-Salween Divide, N.W. Yunnan (c.3,330 m, rocky and ravine slopes); G. Forrest. AMNH 543105: m; collected September 1925; Shweli-Salween Divide, N.W. Yunnan (c.3,330 m, rocky and ravine slopes); G. Forrest. AMNH 543107: f; collected September 1925; Shweli-Salween Divide, N.W. Yunnan; G. Forrest. AMNH 543108: m; collected 26.5.1913; Yonggyap Latsa (Abor or Mishmi hills, c.3,480 m), Capt. F. W. Bailey. MCZ 149255: m; collected August 1925; Shweli-Salween Divide, N.W. Yunnan (c.3,330 m). Forrest. NHM 1871-12-1-1 (Type Specimen): m; died on 12.11.1871 in the Zoological Society’s Gardens, Regents Park, London; collected from Mishmi Hills, Upper Assam; brought by locals to T.C. Jerdon. NHM 1889-5-10-1953: m; collected December 1879; Mishmi Hills, N.E. Assam; Hume Collection (Sir S. Bayley). NHM 1895-7-14-730:f; collected possibly 1879; Eastern Assam, India; Lt. Col. H.H. Godwin-Austen. NHM 1914-10-5-1: m; collected 24.3.1913; Tsu River, Mishmi Hills, N.E. Assam (c.2,360 m); Capt. F.M. Bailey. NHM

1925-5-8-1: f; collected 14.12.1924; Tsangpo Gorge (Po Tsangpo confluence), Tibet (c.2,725 m); F. Kingdon Ward (P). NHM 1925-5-8-2: Immature m; collected 14.12.1924; Po Tsangpo, Tibet (c.2,725 m); F. Kingdon Ward. NHM 1928-7-14-3: m; collected October 1925; Myitkyina district, Upper Burma; Mrs. M. West (P). NHM 1928-7-14-4: m; collected October 1925; Myitkyina district, Upper Burma; Mrs. M. West (P). NHM 1933-11-13-25: m; collected Jan–Feb 1931; Koi Tou Tengyeuh, N.W. Yunnan, China; G. Forrest. NHM 1933-11-13-26: f; collected Jan–Feb 1931; Koi Tou Tengyeuh, N.W. Yunnan; G. Forrest. NHM 1938-12-13-454: f; collected 14.5.1938; Lo La (South) Pachakshiri, S.E. Tibet (c.3,480 m); F. Ludlow & G. Sherriff. NHM 1938-12-13-455: m; collected 15.5.1938; Lo La (South) Pachakshiri, S.E. Tibet (c.3,480 m.); F. Ludlow & G. Sherriff. NHM 1938-12-13-456: m; collected 14.5.1938; Lo La (South) Pachakshiri, S.E. Tibet (c.3,480 m); F. Ludlow & G. Sherriff. NHM 1938-12-13-457: m; collected 15.5.1938; Lo La (South) Pachakshiri, S.E. Tibet (c.3,480 m); F. Ludlow & G. Sherriff. NHM 1938-12-13-463: f; collected 15.5.1938; Lo La (South) Pachakshiri, S.E. Tibet (3,485 m); F. Ludlow & G. Sherriff. NHM 1938-12-13-605: m; collected 14.5.1938; Lo La (South) Pachakshiri, S.E. Tibet (c.3,480m); F. Ludlow & G. Sherriff. NHM 1941-12-1-673: m; collected May 1934; 18 miles ENE of Hpinaw, Myitkyina-Yunnan border, Upper Burma (c.3,780–3,940 m); G. W. Whittall. NHM 1948-27-18: m; collected 20.2.1947; Trulung, Po Tsangpo Valley, S.E. Tibet (c. 2,880 m); F. Ludlow (P). NHM 1948-34-1: m; collected 28.3.1948; Chimli Pass, Burma (c.3,180 m); B.E. Smythies (P). NHM 1948-34-2: f; collected 29.3.1948; Chimli Pass, Burma (c.3,180 m); B.E. Smythies (P).

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## Notes on breeding birds from an Ecuadorian lowland forest

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The lowlands of eastern Ecuador are popular for birdwatching tours as well as ornithological research. Despite this, and the increased interest in the Ecuadorian avifauna in the past 15 years (e.g. Krabbe 1992, Best *et al.* 1993, Rasmussen *et al.* 1996, Ridgely & Greenfield 2001), little has been written concerning the breeding biology of birds in the area (but see Greeney 1999, Hill & Greeney 2000, Greeney *et al.* 2000). As a whole, the natural history, ecology and breeding biology of tropical birds remains poorly understood (Hilty 1994). Here we present data on 32 species, collected over recent years, from two adjacent field sites in the Sucumbios province of eastern Ecuador. Observations were made opportunistically, during the course of other activities, and on their own are not useful for accessing patterns of seasonality. Nonetheless, in conjunction with past and future observations, the data presented here make a significant contribution to our knowledge of birds from this poorly studied area of Ecuador.

Sacha Lodge Research Station (SLRS) (00°26'S, 76°27'W) is located near the community of Añangu, c.65 km east-southeast of Coca along the Napo River at an elevation of 250 m. La Selva Biological Station (LSBS) (00°29'S, 76°22'W) is located only 10 km further downriver from SLRS. Both of these sites are located on